



SUSTAINABLE DESIGN AND ADAPTIVE REUSE OF BUILDING 170 AT FORT MCPHERSON

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**BRIEFING TO THE ARMY WORLDWIDE ENVIRONMENTAL AND
ENERGY CONFERENCE**

**DAVID S. EADY
ARMY ENVIRONMENTAL POLICY INSTITUTE**



OUTLINE

- **BRIEFING PURPOSE**
- **PROJECT OBJECTIVES**
- **DESIGN OBJECTIVES**
- **CHARRETTE RESULTS**
- **ANTICIPATED PERFORMANCE**



BRIEFING PURPOSE

- **DESCRIBE OUTPUTS AND OUTCOMES FROM A “CASE STUDY” SUSTAINABLE DESIGN CHARRETTE**
- **EXPLAIN CONSIDERATIONS FOR ADAPTIVE REUSE OF HISTORICAL PROPERTIES**
- **SUGGEST APPLICATIONS OF LESSONS LEARNED TO FUTURE RENOVATION PROJECTS**



PROJECT OBJECTIVES

- **SUPPORT TENANT AND INSTALLATION MISSION**
- **PRESERVE HISTORIC INTEGRITY AND VALUE**
 - Historic structure with 21st Century engineering and technology
- **DEMONSTRATE “BEST PRACTICES”**
 - In both building science and sustainable design/construction
 - Underlying premise: “the building is the briefing”
- **PROVIDE WORLD-CLASS WORKING ENVIRONMENT**



DESIGN OBJECTIVES

- **DEMONSTRATE SUSTAINABLE DESIGN**
- **IMPROVE LIFECYCLE COST EFFECTIVENESS**
- **OPTIMIZE RESOURCE EFFICIENCY AND LIFECYCLE PERFORMANCE**
- **MINIMIZE RESOURCE AND ECOLOGICAL IMPACTS**
- **COMPLIMENT COMMUNITY CHARACTER AND IMPROVE QUALITY OF LIFE**



DESIGN PROCESS

- **INTEGRATED PLANNING AND DESIGN**
 - AEPI partnership with FORSCOM and Garrison
 - Multidisciplinary “tiger team” of experts
 - 2-3 day design “charrette” (funded by FORSCOM and AEPI)
 - “Whole systems” approach to building design
- **PERFORMANCE-BASED CRITERIA**
- **ENVIRONMENTALLY PREFERABLE PURCHASING**



DESIGN CONSIDERATIONS

- **DOI GUIDANCE ON REHABILITATION AND RESTORATION OF HISTORIC STRUCTURES**
- **U.S. GREEN BUILDING COUNCIL'S LEED™ RATING SYSTEM**
 - **SITE PLANNING**
 - **WATER EFFICIENCY**
 - **MATERIALS (INCLUDES ARCHITECTURE)**
 - **ENERGY & ATMOSPHERE**
 - **INDOOR ENVIRONMENTAL QUALITY (IEQ)**



Assistant Secretary of the Army (Installations and Environment)



DESIGN RECOMMENDATIONS

- **SITE PLANNING**
- **WATER EFFICIENCY**
- **ARCHITECTURE & MATERIALS**
- **ENERGY EFFICIENCY**



SITE PLANNING

- **REDUCE “HEAT ISLAND” EFFECT**
 - Implement alternative groundcover strategies to cool the site
 - Increase shading of parking areas and site amenities
- **PLANT NATIVE TREES AND SHRUBS**
 - Minimize intensity and cost of grounds maintenance
 - Improve shading of building for energy efficiency
 - Mitigate building-related CO2 emissions
- **INTEGRATE WITH HISTORIC LANDSCAPE**
 - Enhance shading along corridor to Main Gate and public transit
 - Use landscaping schemes consistent with historic plantings



WATER EFFICIENCY

- **CAPTURE / REUSE RAINWATER AND GRAYWATER**
 - Irrigate site green-spaces
 - Filter and divert to water cooling tower
 - Contribute to Fort McPherson “closed-loop” system
- **INSTALL HIGH-EFFICIENCY FIXTURES**
 - Explore use of “waterless urinals”
 - Use sensors for sinks, urinals and toilets to control flow
- **TREAT WASTEWATER ON-SITE USING ECOLOGICAL PROCESSES**
 - Explore feasibility of using “living machines” or constructed wetlands to treat wastewater used and/or collected on-site



ARCHITECTURE & MATERIALS

- **RESTORATION AND CONTINUED USE OF HISTORIC ARCHITECTURAL FEATURES**
 - Restore existing windows or replace with historic reproductions
 - Remove connector between buildings to restore historic façade
- **IMPROVE ENERGY EFFICIENCY OF BUILDING ENVELOPE**
 - Insulate roofline with R-30 and seal roof vents to accommodate HVAC equipment housed in attic space
 - Install high efficiency “storm windows” to inside of existing windows
 - Add insulating materials to inside of exterior wall to increase R-Value
- **INSTALL WATER-PROOF APRON AROUND BUILDING BASE**
 - Divert bulk moisture from the foundation wall



ARCHITECTURE & MATERIALS

- **INVENTORY AND SALVAGE REUSABLE AND/OR RECYCLABLE MATERIALS**
 - Reuse granite/marble bathroom stalls and ceramic tile, when feasible
 - Retain 80% of interior walls for historic character and waste reduction
 - Reuse brick and plaster for site improvements
- **PURCHASE MATERIALS FROM LOCAL RESOURCES**
 - Give preference to Atlanta region, then Georgia and Southeast
- **USE ENVIRONMENTALLY PREFERABLE PRODUCTS**
 - Explore recycled rubber roofing shingles in lieu of slate materials
 - Lease “floor-covering service” from local carpeting manufacturers



ENERGY EFFICIENCY

- **USE OFF-GRID POWER SUPPLY**
 - Demonstrate fuel cell technology and capture waste heat
 - Integrate solar technologies, as feasible and appropriate
- **USE DAY-LIGHTING AND CONTROLLED LIGHT INTENSITY**
 - Raise ceiling to original 11' height and restore, replace or install transoms (as needed) over interior doors
 - Use high-efficiency fluorescent lights with dimmable ballasts, occupancy sensors and daylight intensity sensors
 - Reduce lighting load to <0.3 watts per square foot
- **INSTALL ENERGY EFFICIENT “SUPERWINDOWS”**
 - Minimize summer heat gain: SHGC < 0.4; R-Value > R-5 (whole unit)
 - Maximize day-lighting: VT > 0.7
 - Optimize windows based on orientation



ENERGY EFFICIENCY

- **INSTALL LOW-PRESSURE VARIABLE AIR VOLUME SYSTEM**
 - Attic located system supplies looped ducts on each floor
 - Maintain a constant pressure in the ductwork, varying air volume based on occupant demand
 - Flow through supply vents independently controlled for comfort
 - Maintain positive pressure in the building to minimize infiltration of poor quality air and to remove moisture and radon potentially collecting in basement
- **INSTALL SEPARATE FRESH AIR VENTILATION SYSTEM**
 - Outside air captured at the roof level for higher quality outside air
 - System would filter air for optimum quality and possibly pre-treat for cooling/heating as needed
 - Controls IAQ and uses “free energy” periods in fall and spring



ANTICIPATED PERFORMANCE

- **“GOLD CERTIFIED” RATING ON LEED™ SYSTEM**
 - ESTIMATED SCORE: 70% OF POSSIBLE POINTS
- **50-60% ENERGY USE REDUCTION FROM BASELINE**
 - ASSUMES ENVELOPE UPGRADES, DAYLIGHT HARVESTING, (VARIABLE) HIGH-EFFICIENCY LIGHTING, HVAC UPGRADES, ETC.
- **50-60% ANNUAL ENERGY COST REDUCTION**
 - EST. BASELINE = \$25K/YR; EST. SAVINGS = \$14K/YR
- **NO ADDITIONAL “FIRST COST”**
 - WITHIN 5% CONTINGENCY FOR AUTHORIZED FUNDING
 - NOT INCLUDED: SITE IMPROVEMENTS, FUEL CELL (R&D-FUNDED), OFFICE FURNISHINGS, AND COMMUNICATION/DATA SYSTEMS



LESSONS LEARNED

- **SUSTAINABLE DESIGN FOR HISTORIC RESTORATIONS MUST BALANCE EFFICIENCY WITH “CHARACTER”**
- **RENOVATION PROJECTS OFTEN INCLUDE MULTIPLE TASK ORDERS VERSUS ONE “DESIGN / BUILD” CONTRACT FOR MILCON**
- **PROJECTS NEED COMMITTED LEADERS AND KNOWLEDGEABLE MANAGERS TO ENSURE EFFECTIVE IMPLEMENTATION OF INTEGRATED DESIGNS**
- **SUSTAINABLE DESIGN AND ADAPTIVE REUSE PROJECTS CAN COST NO MORE THAN NEW CONSTRUCTION**
- **ADAPTIVE REUSE OF HISTORIC PROPERTIES CAN RESULT IN ENERGY EFFICIENT, HIGH QUALITY BUILT ENVIRONMENTS**